REMARKS

Claims 25 and 28-48 are currently pending in this application.

The Examiner has rejected claims 25 and 28-48 under 35 U.S.C. § 112, second paragraph, for indefiniteness. The Examiner asserts that meaning of the recitation "stable" in independent claims 25 and 33 is unclear. The word "stable" which precedes the recitation "deposited plasma layer" in claims 25 and 33, means that the plasma layer on the surface of the substrate does not suffer from loss of mass of the surface upon further treatment. The properties that exhibit a stable deposited plasma layer are quantified in the comparative test data shown in Tables 1 and 4 on pages 7 and 11, respectively, of the present specification. Further, according to Webster's II New College Dictionary (1994), the plain meaning of the word "stable" as it relates to chemistry is defined as "not easily decomposed or otherwise modified chemically." Therefore, the meaning of the word "stable" as used in claims 25 and 33 is consistent with its plain meaning. In view of the above, reconsideration and withdrawal of the rejection of claims 25 and 28-48 are respectfully requested.

The present invention, as claimed in independent claim 25, is directed to a device for investigating reactions between interactive chemical or biological species. The device includes a substrate and a plasma layer. The substrate includes a film of free electron metal that consists essentially of gold. The plasma layer includes sulfur plasma which is deposited directly on the gold film of the substrate and defines a stable deposited layer. As discussed in detail below, none of the cited prior art references teaches or suggests a sulfur plasma layer deposited directly onto a gold surface as claimed.

The Examiner finally rejected claims 25, 28-34, 37-40, 44, 45 and 48 under 35 U.S.C. § 103(a) for obviousness over the teachings of European Patent 0 104 608 to Dunn et al. (hereinafter "the Dunn patent") in view of U.S. Patent No. 6,291,188 to Meade et al. (hereinafter "the Meade patent"). The Examiner cites the Dunn patent for the asserted teaching of depositing sulfur plasma onto metal surfaces. The Examiner relies upon the Meade patent for the asserted teaching of the advantages of a substrate comprising a film of gold and a sulfur layer deposited directly onto the substrate. Therefore, the Examiner contends that it would have been obvious to one of ordinary skill in the art to deposit sulfur

moieties directly onto a gold film as taught by the Meade patent into the method and apparatus of the Dunn patent in order to provide covalent attachment of a sulfur to a metallic gold film. Applicants respectfully traverse this asserted rejection of the claims.

The Dunn patent is directed to a method for chemically modifying the surface of organic and/or inorganic substrates for attachment of large molecules having available functional groups, such as proteins. Further, the surface of the substrate is irreversibly modified by grafting specific chemical functional groups onto the surface with a plasma of suitable material, such as sulfur (see page 5, lines 13-20). The Dunn patent also discloses that the surfaces to be modified can be made of inorganic materials, such as non-metals, metals and metal oxide. The metals can include iron, aluminum, tin, copper and nickel (page 8, lines 30-31). Examples 1-3 of the Dunn patent discloses the use of plasma deposited onto polystyrene. As discussed below in detail, there is no teaching, suggestion or motivation in the Dunn patent to deposit a plasma layer directly onto a gold substrate.

The motivation to modify the prior art must flow from some teaching in the art that suggest the desirability or incentive to make the modification needed to arrive at the claimed invention. The motivation must come from the prior art, and not from the applicant's specification. In *EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d at 907, it states that "a reference must be considered for everything it teaches by the way of technology and is not limited to the particular invention it is describing and attempting to protect. On the issue of obviousness, the combined teachings of the prior art as a whole must be considered." By the same token, "[i]t is impermissible within the framework of § 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Wesslau*, 353 F.2d 238, 241. As discussed in detail below, a fair reading of the Dunn patent in its entirety would not lead the skilled artisan to use gold as a substrate.

Examples 1-3 of the Dunn patent refer to a polystyrene substrate which is drastically different from a gold substrate. Polystyrene is an inexpensive and hard plastic that is produced by free radical vinyl polymerization from the monomer styrene. Polystyrene is typically used to make rigid durable products, such as television and computer cabinets,

appliances, toys, etc. Further, the list of metals disclosed in the Dunn patent includes iron, aluminum, tin, copper and nickel, but not gold. Each of the five listed metals is unique and exhibits different surface characteristic, such as adhesion, during plasma deposition. For example, copper (i.e, Group Ib transition metal) has specific bonding characteristics that are different from iron (i.e., Group VIII metal) and, therefore, would exhibit different adhesion properties during plasma deposition. The person skilled in the vapor plasma deposition art knows that changing the substrate from one metal to another (without changing any other parameters) can substantially effect the deposition rate and the adhesion properties of the deposited material during plasma deposition. In *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 448-449, the District Court held "...by failing to consider a prior art reference in its entirety, ignored portions of the reference that read away from obviousness." When considering the Dunn patent in its entirety, wherein all of the Examples use a polystyrene substrate and the list of metal substrates fails to disclose gold, the Dunn patent directs away from the use of gold as a substrate for plasma deposition. Therefore, absent hindsight, there is no desire or incentive in the Dunn patent to use gold as a substrate.

The Meade patent requires the particular orientation of both a sulfur-containing moiety and the terminal groups X (i.e., Formula 1, column 4, lines 1-10) or the nucleic acid (i.e., Formula 2, column 8, lines 10-17). The terminal groups of the Meade patent are chosen to modulate the interaction between the nucleic acid and the blocking moieties on the surface, wherein these terminal groups are used to influence the exposed surface of the monolayer. For example, the specific orientation of the compound on the surface of the Meade patent is such that one terminal end is pointing to the gold surface and the other terminal end is pointed to the environment. Because of the numerous and unpredictable crosslinking reactions occurring on the surface during plasma polymerization, the specific type of orientation required in the process of the Meade patent could not be achieved by gas plasma deposition, thereby destroying the intended function of the attachment process in the Meade patent. Further, the sulfur-containing moieties of Meade et al. are not volatile enough to be able to be deposited by gas plasma deposition. Therefore, absent hindsight, there is no teaching,

suggestion or incentive in the Meade patent to deposit sulfur on a gold surface by plasma deposition.

The proper standard for combining references under § 103 requires determining what the prior art would have led a skilled person to do. As discussed above, the skilled artisan would not have been led to try gold as a substrate for plasma deposition after a fair reading of the Meade patent and the Dunn patent. In the attached Affidavit by Dr. Gerardus Engbers (one of the named inventors of the present application), Dr. Engbers has studied the Office Action and each of the prior art references cited by the Examiner. The Affidavit substantiates that a skilled artisan would not conclude from a fair reading of the Meade patent and the Dunn patent that it would have been obvious to deposit a sulfur by means of plasma deposition onto a gold surface. In view of the above, reconsideration and withdrawal of the rejection of claims 25, 28-34, 37-40, 44, 45 and 48 are respectfully requested.

Regarding the asserted obviousness rejection of claim 35 over the Dunn patent and the Meade patent in view of U.S. Patent No. 5,723,219 to Kolluri et al (hereinafter "the Kolluri patent"), the Examiner relies on the Kolluri patent for the teaching of the use of the gas monomer and plasma polymerization techniques. Claim 35 depends directly from amended independent claim 33 and is thus allowable over the teachings of the Dunn patent and the Meade patent for the reasons discussed above.

Regarding the obviousness rejection of claim 36 over Dunn patent and the Meade patent in view of U.S. Patent No. 5,932,296 to Sluka et al. (hereinafter "the Sluka patent"), the Examiner relies on the Sluka patent for the teaching of the step of cleaning the substrate by means of a pulse argon plasma before the application of the functional groups to the substrate. However, claim 36 depends directly from claim 33 and is allowable over the teachings of the Dunn patent and the Meade patent for the reasons discussed above.

Regarding the obviousness rejection of claims 41-43, 46, and 47 over the Dunn patent and the Meade patent in view of U.S. Patent No. 5,991,488 to Salamon et al. (hereinafter "the Salamon patent"), the Examiner relies on the Salamon patent for the teaching of a surface plasmon resonance spectroscopy. Claims 41-43, 46 and 47 depend either directly

or indirectly from independent claim 33 and are believed to be allowable over the teachings of the Dunn patent and the Meade patent for the same reasons as discussed above.

CONCLUSION

In view of the foregoing, Applicants believe that claims 25 and 28-48 are patentable over the prior art of record and are in condition for allowance. Reconsideration and withdrawal of the Examiner's rejections and allowance of claims 25 and 28-48 are respectfully requested.

Respectfully submitted,

WEBB ZIESENHEIM LOGSDON
ORKIN & HANSON, P.C.

By _____

Barbara E. Johnson
Registration No. 31,198
Attorney for Applicants
700 Koppers Building
436 Seventh Avenue
Pittsburgh, PA 15219-1818
Telephone: 412-471-8815
Facsimile: 412-471-4094
E-mail: webblaw@webblaw.com

AFFIDAVIT

In regard of US Patent Application 09/762,779 in the name of Holland Biomaterials Group, I, Gerardus Henricus Maria ENGBERS, Vlaanderenlaan 3, NL-7577 MB Oldenzaal, The Netherlands being one of the inventors named in the above referred to US Patent Application, do hereby declare the following.

I have studied the Office Action from the USPTO having a mailing date of the 10th of July 2003 as well as the documents referred to therein, being namely the European Patent Application 104608 of Dunn et al and the US Patent 6291188 in the name of Meade et al.

From this Office Action, it is apparent that the Examiner is of the opinion that Dunn describes a method and device for modifying the surface of a substrate with a suitable material by means of plasma deposition.

Dunn makes no reference to a substrate comprising a gold film. Nor does Dunn refer to the plasma layer being deposited directly onto the substrate.

According to the Examiner, Meade describes a method for treating a gold substrate by means of directly depositing a compound thereon, which compound comprises sulphur. The sulphur makes direct contact with the gold surface.

Meade makes no reference to plasma deposition of the sulphur comprising compound onto the gold surface.

However, on the basis of a combination of these described techniques, the Examiner concludes that it is obvious to provide a substrate, having a gold film, with a layer, which comprises sulphur compounds, by means of plasma deposition.

With respect, this is not the conclusion the skilled person would arrive at on the basis of these two documents.

Having reference to Meade, this describes the use of a gold substrate, and depositing thereon by means of wet chemistry a compound which has a sulphur group on one side thereof.

Having reference to Dunn, this describes deposition of a material which can comprise sulphur, oxygen, carbon, hydrogen, nitrogen, a halogen, for phosphor, onto a layer which may be metal, non-metal, a metal oxide, a mineral, salt, or glass.

The examples of Dunn relate to sulphur or nitrogen being plasma deposited onto polystyrene.

A skilled person would not conclude from this that it would be obvious to deposit a sulphur comprising material onto a metal, let along gold, by means of plasma deposition. Polystyrene is a vastly different material to gold.

This is even more so considering that Meade teaches a sulphur comprising compound that is not volatile enough to be able to be deposited by plasma deposition.

Instead, Meade describes the gold layer being arranged by standard methods, the self-assembled monomers (SAM's) referred to in claim 1 and in the examples.

Meade chooses SAM's since Meade requires a specific orientation of the compound on the surface whereby one terminal is pointed to the gold surface and the other terminal is pointed to the environment.

This type of orientation is not achieved in the current process by gas plasma deposition.

During gas plasma deposition a certain fragmentation of the compound occurs, which is an essential requirement for deposition of the compound. Meade most certainly does not want fragmentation to occur since this would damage the composition of the sulphur containing compounds whereby the interactions with the surfaces would be negatively influenced.

Furthermore, as stated above, the sulphur comprising compounds of Meade et al are not volatile enough to be able to be deposited by gas plasma deposition.

The Meade document does not mention the volatility of the sulphur compounds.

Accordingly a skilled person concludes that plasma deposition would not be considered for these sulphur compounds.

As such it would not be obvious for a skilled person, on the basis of Dunn and Meade, to directly arrange a sulphur comprising layer by means of plasma deposition onto a gold substrate.

Dr. ir. G. H. M. Engbers

Date:

Place: